DEPARTMENT OF ENERGY

10 CFR Part 430

[EERE-2021-BT-STD-0035 and EERE-2021-TP-0036]

Energy Conservation Program: Test Procedure and Energy Conservation Standards for Consumer Products; Consumer Air Cleaners

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Request for information.

SUMMARY: The U.S. Department of Energy ("DOE") is initiating rulemaking activities to consider potential test procedure and energy conservation standards for consumer air cleaners. Through this request for information ("RFI"), DOE seeks data and information regarding development and evaluation of a new test procedure that would be reasonably designed to produce test results which reflect energy use during a representative average use cycle for the product without being unduly burdensome to conduct. Additionally, this RFI solicits information regarding the development and evaluation of potential new energy conservation standards for consumer air cleaners, and whether such standards would result in significant energy savings, be technologically feasible and economically justified. DOE also welcomes written comments from the public on any subject within the scope of this document (including those topics not specifically raised), as well as the submission of data and other relevant information.

DATES: Written comments and information are requested and will be accepted on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov*. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE-2021-BT-STD-0035 and EERE-2021-BT-TP-0036, by any of the following methods:

1. *Federal eRulemaking Portal*: *www.regulations.gov*. Follow the instructions for submitting comments.
2. *E-mail*: to *AirCleaners2021STD0035@ee.doe.gov* or *AirCleaners2021TP0036@ee.doe.gov*. Include docket number EERE-2021-BT-STD-0035 and EERE-2021-BT-TP-0036 in the subject line of the message.

No telefacsimilies ("faxes") will be accepted. For detailed instructions on submitting comments and additional information on this process, see section IV of this document.

Although DOE has routinely accepted public comment submissions through a variety of mechanisms, including postal mail and hand delivery/courier, the Department has found it necessary to make temporary modifications to the comment submission process in light of the ongoing Coronavirus disease 2019 ("COVID-19") pandemic. DOE is currently suspending receipt of public comments via postal mail and hand delivery/courier. If a commenter finds that this change poses an undue hardship, please

contact Appliance Standards Program staff at (202) 586-1445 to discuss the need for alternative arrangements. Once the COVID-19 pandemic health emergency is resolved, DOE anticipates resuming all of its regular options for public comment submission, including postal mail and hand delivery/courier.

*Docket***:** The docket for this activity, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at *www.regulations.gov*. All documents in the docket are listed in the *www.regulations.gov* index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web pages can be found at: *www.regulations.gov/docket/EERE-2021-BT-TP-0036 and www.regulations.gov/docket/EERE-2021-BT-STD-0035*. The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section IV for information on how to submit comments through *www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: Dr. Stephanie Johnson, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1943. E-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

Ms. Amelia Whiting, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-2588. E-mail: *Amelia.Whiting@hq.doe.gov*.

For further information on how to submit a comment or review other public comments and the docket, contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by e-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Introduction

Consumer air cleaners are not currently subject to a DOE test procedure or energy conservation standards. On September 16, 2021, DOE published a notice of proposed

determination ("NOPD") in which DOE tentatively determined that consumer air cleaners qualify as a "covered product" under the Energy Policy and Conservation Act, as amended ("EPCA")[1] ("September 2021 NOPD"). 86 FR 51629. DOE tentatively determined in the September 2021 NOPD that coverage of consumer air cleaners is necessary or appropriate to carry out the purposes of EPCA, and that the average U.S. household energy use for consumer air cleaners is likely to exceed 100 kilowatt-hours ("kWh") per year. *Id*.

The following sections discuss DOE's authority to establish test procedures and energy conservation standards for covered products, relevant background information regarding DOE's consideration of establishing federal regulations for consumer air cleaners, if DOE determines such products are covered products, and a discussion of DOE's rulemaking process for test procedures and energy conservation standards.

A. Statutory Authority

EPCA authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B[2] of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency for certain products, referred to as "covered products."[3] In addition to specifying a list of consumer products that are covered products, EPCA contains provisions that enable the Secretary of Energy to classify additional types of consumer

[1] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2020).
[2] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.
[3] The enumerated list of covered products is at 42 U.S.C. 6292(a)(1)–(19).

products as covered products. To classify a consumer product as a covered product, the Secretary must determine that:

1) Classifying the product as a covered product is necessary or appropriate to carry out the purposes of EPCA; and
2) The average annual per household[4] energy use by products of such type is likely to exceed 100 kWh (or British thermal unit ("Btu") equivalent) per year.

(42 U.S.C. 6292(b)(1)) As stated, DOE has preliminarily determined that consumer air cleaners are covered products. 86 FR 51629.

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation

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4 DOE has defined "household" to mean an entity consisting of either an individual, a family, or a group of unrelated individuals, who reside in a particular housing unit. For the purpose of this definition:
(1) *Group quarters* means living quarters that are occupied by an institutional group of 10 or more unrelated persons, such as a nursing home, military barracks, halfway house, college dormitory, fraternity or sorority house, convent, shelter, jail or correctional institution.
(2) *Housing unit* means a house, an apartment, a group of rooms, or a single room occupied as separate living quarters, but does not include group quarters.
(3) *Separate living quarters* means living quarters:
(i) To which the occupants have access either:
(A) Directly from outside of the building, or
(B) Through a common hall that is accessible to other living quarters and that does not go through someone else's living quarters, and
(ii) Occupied by one or more persons who live and eat separately from occupant(s) of other living quarters, if any, in the same building. 10 CFR 430.2.

testing, labeling, and standards. (42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of that product (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the product complies with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

In 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. Specifically, EPCA provides that DOE may, in accordance with certain requirements, prescribe test procedures for any consumer product classified as a covered product under section 6292(b). (42 U.S.C. 6293(b)(1)(B)) EPCA requires that any test procedures prescribed or amended under this section must be reasonably designed to produce test results which reflect energy efficiency, energy use or estimated annual operating cost of a given type of covered product during a representative average use cycle and must not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, EPCA requires DOE to amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption into the overall energy efficiency, energy consumption, or other energy descriptor. (42 U.S.C. 6295(gg)(2)(A)) When doing so, DOE must take into consideration the most current

versions of Standards 62301 and 62087 of the International Electrotechnical Commission ("IEC"), unless the current test procedure already incorporates the standby mode and off mode energy consumption, or if such integration is technically infeasible. If an integrated test procedure is technically infeasible, DOE must prescribe separate standby mode and off mode energy use test procedures for the covered product, if a separate test is technically feasible. (*Id*.)

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed, the Secretary shall promptly publish in the *Federal Register* a proposed test procedure and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such a procedure. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and no more than 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)) In prescribing a new or amended test procedure, DOE must follow the statutory criteria of 42 U.S.C. 6293(b)(3)–(4), as discussed further in section I.C of this document, and follow the rulemaking procedures set out in 42 U.S.C. 6293(b)(2). Before prescribing any final test procedure, the Secretary must publish a proposed test procedure in the *Federal Register,* and afford interested persons an opportunity (of not less than 60 days' duration) to present oral and written data, views, and arguments on the proposed test procedure. (42 U.S.C. 6293(b)(2)).

Similarly, DOE must follow specific statutory criteria for prescribing new or amended standards for covered products. Following a coverage determination, DOE may

prescribe an energy conservation standard for any type (or class) of covered products of a type specified in section 6292(a)(20) of EPCA, if the substantive and procedural requirements of 42 U.S.C. 6295(o) and (p) are met and the Secretary determines that: (1) the average per household energy use within the United States by products of such type (or class) exceeded 150 kWh (or its Btu equivalent) for any 12-month period ending before such determination; (2) the aggregate household energy use within the United States by products of such type (or class) exceeded 4,200,000,000 kWh (or its Btu equivalent) for any such 12-month period; (3) substantial improvement in the energy efficiency of products of such type (or class) is technologically feasible; and (4) the application of a labeling rule under section 6294 of this title to such type (or class) is not likely to be sufficient to induce manufacturers to produce, and consumers and other persons to purchase, covered products of such type (or class) which achieve the maximum energy efficiency which is technologically feasible and economically justified. (42 U.S.C. 6295(l)(1)) Further, any new or amended standard for covered products of a type specified in paragraph (20) of section 6292(a) of this title shall not apply to products manufactured within 5 years after the publication of a final rule establishing such standard. (42 U.S.C. 6295(1)(2)

Further, EPCA requires that any new or amended energy conservation standard prescribed by the Secretary be designed to achieve the maximum improvement in energy or water efficiency that is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) The Secretary may not prescribe an amended or new standard that will not result in significant conservation of energy, or is not technologically feasible or economically justified. (42 U.S.C. 6295(o)(3)) DOE must evaluate proposed new standards against the criteria of 42 U.S.C. 6295(o), as described further in section I.D of

this document, and follow the rulemaking procedures set out in 42 U.S.C. 6295(p). DOE is publishing this RFI consistent with its authority and these obligations.

B. Rulemaking History

DOE has not previously conducted a rulemaking for consumer air cleaners. As stated, DOE tentatively determined in the September 2021 NOPD that: coverage of consumer air cleaners is necessary or appropriate to carry out the purposes of EPCA; the average U.S. household energy use for consumer air cleaners is likely to exceed 100 kWh per year; and thus, consumer air cleaners qualify as a "covered product" under EPCA. 86 FR 51629. In the September 2021 NOPD, DOE sought comment on: (1) a proposed definition for consumer air cleaners; (2) the energy use analysis conducted in support of the September 2021 NOPD; and (3) additional information and data to support DOE's preliminary determination to classify consumer air cleaners as a covered product under EPCA. 86 FR 51629, 51632–51633.

DOE is currently evaluating comments received from interested parties in response to the September 2021 NOPD. DOE will address these comments and publish a final decision on coverage as a separate notice.

C. Rulemaking Process for Test Procedure

As stated, EPCA requires that any test procedure prescribed or amended must be reasonably designed to produce test results which reflect energy efficiency, energy use or estimated annual operating cost of a particular type of covered product during a representative average use cycle and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

DOE will publish a notification in the *Federal Register* (*e.g.*, an RFI or notice of data availability ("NODA")) whenever DOE is considering initiation of a rulemaking to establish or amend a test procedure. Section 8(a) of the Process Rule.

As part of such document(s), DOE will solicit submission of comments, data, and information on whether DOE should proceed with the rulemaking. Potential topics include whether a test procedure rule would more accurately measure energy efficiency, energy use, or estimated annual operating cost of a product during a representative average use cycle or period of use without being unduly burdensome to conduct; or reduce testing burden. Based on the information received in response to such request and its own analysis, DOE will determine whether to proceed with a rulemaking for a new or amended test procedure. Section 8(a)(1) and (a)(2) of the Process Rule.

As detailed throughout this RFI, DOE is publishing this document seeking input and data from interested parties to aid in DOE's determination whether (and if so, how) to establish a test procedure for consumer air cleaners.

D. Rulemaking Process for Energy Conservation Standards

As stated previously, following a coverage determination, DOE may prescribe an energy conservation standard for any type (or class) of covered products of a type specified in section 6292(a)(20) of EPCA, if the substantive and procedural requirements in 42 U.S.C. 6295(o) and (p) are met and the Secretary determines that: (1) the average per household energy use within the United States by products of such type (or class) exceeded 150 kWh (or its Btu equivalent) for any 12-month period ending before such determination; (2) the aggregate household energy use within the United States by products of such type (or class) exceeded 4,200,000,000 kWhs (or its Btu equivalent) for

any such 12-month period; (3) substantial improvement in the energy efficiency of products of such type (or class) is technologically feasible; and (4) the application of a labeling rule under section 6294 of this title to such type (or class) is not likely to be sufficient to induce manufacturers to produce, and consumers and other persons to purchase, covered products of such type (or class) which achieve the maximum energy efficiency which is technologically feasible and economically justified. (42 U.S.C. 6295(l)(1)) Further, any new or amended standard for covered products of a type specified in paragraph (20) of section 6292(a) of this title shall not apply to products manufactured within 5 years after the publication of a final rule establishing such standard. (42 U.S.C. 6295(1)(2)

DOE must follow specific statutory criteria for prescribing new or amended standards for covered products. As stated, EPCA requires that any new or amended energy conservation standard prescribed by the Secretary be designed to achieve the maximum improvement in energy (or water efficiency for certain products specified by EPCA) that is technologically feasible and economically justified. (42 U.S.C. 6295(o)(2)(A)) Furthermore, DOE may not adopt any standard that would not result in the significant conservation of energy. (42 U.S.C. 6295(o)(3))

The significance of energy savings offered by a new or amended energy conservation standard cannot be determined without knowledge of the specific circumstances surrounding a given rulemaking.[5] For example, the United States rejoined the Paris Agreement on February 19, 2021. As part of that agreement, the United States has committed to reducing greenhouse gas ("GHG") emissions in order to limit the rise in mean global temperature. As such, energy savings that reduce GHG emission have taken

[5] See 86 FR 70892, 70901 (Dec. 13, 2021).

on greater importance. Additionally, some covered products and equipment have most of their energy consumption occur during periods of peak energy demand. The impacts of these products on the energy infrastructure can be more pronounced than products with relatively constant demand. In evaluating the significance of energy savings, DOE considers differences in primary energy and full-fuel-cycle ("FFC") effects for different covered products and equipment when determining whether energy savings are significant. Primary energy and FFC effects include the energy consumed in electricity production (depending on load shape), in distribution and transmission, and in extracting, processing, and transporting primary fuels (*i.e.,* coal, natural gas, petroleum fuels), and thus present a more complete picture of the impacts of energy conservation standards.

Accordingly, DOE evaluates the significance of energy savings on a case-by-case basis.

To determine whether a standard is economically justified, EPCA requires that DOE determine whether the benefits of the standard exceed its burdens by considering, to the greatest extent practicable, the following seven factors:

(1) The economic impact of the standard on the manufacturers and consumers of the affected products;

(2) The savings in operating costs throughout the estimated average life of the product compared to any increases in the initial cost, or maintenance expenses;

(3) The total projected amount of energy and water (if applicable) savings likely to result directly from the standard;

(4) Any lessening of the utility or the performance of the products likely to result from the standard;

(5) The impact of any lessening of competition, as determined in writing by the

Attorney General, that is likely to result from the standard;

(6) The need for national energy and water conservation; and

(7) Other factors the Secretary considers relevant.

(42 U.S.C. 6295(o)(2)(B)(i)(I)–(VII))

DOE fulfills these and other applicable requirements by conducting a series of analyses throughout the rulemaking process. Table I.1 shows the individual analyses that are performed to satisfy each of the requirements within EPCA.

Table I.1 EPCA Requirements and Corresponding DOE Analysis

EPCA Requirement	Corresponding DOE Analysis
Significant Energy Savings	• Shipments Analysis • National Impact Analysis • Energy and Water Use Determination
Technological Feasibility	• Market and Technology Assessment • Screening Analysis • Engineering Analysis
Economic Justification:	
1. Economic Impact on Manufacturers and Consumers	• Manufacturer Impact Analysis • Life-Cycle Cost and Payback Period Analysis • Life-Cycle Cost Subgroup Analysis • Shipments Analysis
2. Lifetime Operating Cost Savings Compared to Increased Cost for the Product	• Markups for Product Price Determination • Energy and Water Use Determination • Life-Cycle Cost and Payback Period Analysis
3. Total Projected Energy Savings	• Shipments Analysis • National Impact Analysis
4. Impact on Utility or Performance	• Screening Analysis • Engineering Analysis
5. Impact of Any Lessening of Competition	• Manufacturer Impact Analysis
6. Need for National Energy and Water Conservation	• Shipments Analysis • National Impact Analysis
7. Other Factors the Secretary Considers Relevant	• Employment Impact Analysis • Utility Impact Analysis • Emissions Analysis • Monetization of Emission Reductions Benefits • Regulatory Impact Analysis

In determining whether to consider establishing or amending any energy conservation standard, DOE's general process is to publish one or more preliminary (*i.e.*, "pre-NOPR") documents in the *Federal Register* intended to gather information on key issues. Section 6(a)(1) of the Process Rule. Such document(s) could take several forms depending upon the specific proceeding, including a framework document, RFI, NODA, preliminary analysis, or advance notice of proposed rulemaking. Section 6(a)(2) of the

Process Rule. Such document(s) will be published in the *Federal Register*, with any accompanying documents referenced and posted in the appropriate docket. Section 6(a)(1) of the Process Rule.

The pre-NOPR-stage document(s) will solicit submission of comments, data, and information on whether DOE should proceed with the standards rulemaking, including whether any new or amended rule would, as EPCA requires, be economically justified, technologically feasible, and result in a significant savings of energy. Section 6(a)(1) of the Process Rule.

DOE will determine whether to proceed with a rulemaking for a new or amended energy conservation standard based on the information received in response to such request and its own analysis. Section 6(a)(3) of the Process Rule.

As detailed throughout this RFI, DOE is publishing this document seeking input and data from interested parties to aid in the development of the technical analyses on which DOE will ultimately rely to determine whether (and if so, how) to establish energy conservation standards for consumer air cleaners.

E. Deviation from Appendix A

In accordance with Section 3(a) of 10 CFR part 430, subpart C, appendix A, DOE notes that it is deviating from that Appendix's provision that DOE will publish its final coverage determination prior to the initiation of any test procedure or energy conservation standards rulemaking. 10 CFR part 430, subpart C, appendix A, section 5(c). DOE is opting to deviate from this step because DOE believes that providing an opportunity for comment on potential test procedure and energy conservation standards

prior to a final coverage determination for consumer air cleaners allows stakeholders an earlier opportunity to provide comment, information, and data that may help inform DOE's priority setting. DOE also notes that in the Energy Conservation Program for Appliance Standards: Procedures, Interpretations, and Policies for Consideration in New or Revised Energy Conservation Standards and Test Procedures for Consumer Products and Commercial/Industrial Equipment NOPR published on July 7, 2021, DOE proposed to eliminate the requirement that coverage determination rulemakings must be finalized prior to initiation of a test procedure or energy conservation standard rulemaking. 86 FR 35668, 35672. DOE explained that the coverage determination, test procedure, and energy conservation standard rulemakings are interdependent and a coverage determination defines the product/equipment scope for which DOE can establish test procedure and energy conservation standards. It also signals that inclusion of the consumer product is necessary to carry out the purpose of EPCA, *i.e.*, to conserve energy and/or water. In order to make this determination, DOE needs to consider whether a test procedure and energy conservation standards can be established for the consumer product. If DOE cannot develop a test procedure that measures energy use during a representative average use cycle and is not unduly burdensome to conduct (42 U.S.C. 6293(b)(3)) or prescribe energy conservation standards that result in significant energy savings (42 U.S.C. 6295(o), then making a coverage determination is not necessary as it will not result in the conservation of energy. Thus, it is important that DOE be able to gather information and provide stakeholders an opportunity to comment and provide information and data pertinent to test procedure and energy conservation standard rulemakings, while DOE conducts a coverage determination rulemaking. *Id.*

In accordance with Section 3(a) of 10 CFR part 430, subpart C, appendix A, DOE notes that it is deviating from that Appendix's provision requiring a 75-day comment

period for pre-NOPR rulemaking documents for standards. 10 CFR part 430, subpart C, appendix A, section 6(d)(2). DOE is opting to deviate from this step because the 30-day comment period will allow DOE to review comments received in response to this document before finalizing its coverage determination. It would also help inform the Department in prioritizing any potential rulemakings for air cleaners in light of its other on-going rulemakings and statutory requirements. The U.S. Environmental Protection Agency's ("EPA's") ENERGY STAR® Program ("ENERGY STAR Program") includes consumer air cleaners. In light of this, DOE expects that stakeholders have established a strong understanding of the key information and issues that would be of interest to DOE as it considers developing test procedure and energy conservation standards for consumer air cleaners. DOE also expects that test data are likely readily available from the ENERGY STAR Program as well as the Association of Home Appliance Manufacturers' ("AHAM's") Directory of Certified Portable Electric Room Air Cleaners.[6]

II. Request for Information and Comments Pertaining to Potential Test Procedure

In the following sections, DOE has identified a variety of issues on which it seeks input to assist in its evaluation of a potential test procedure for consumer air cleaners, to ensure that any such test procedure would, as EPCA requires, be reasonably designed to produce test results which reflect energy use during a representative average use cycle without being unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

A. Scope and Definition

[6] See: *www.ahamdir.com/room-air-cleaners/*

Consumer air cleaners are products designed to remove particulate matter and other contaminants from the air to improve indoor air quality. A wide range of consumer air cleaners are available on the market, including tabletop units, units designed for single rooms or multiple rooms, and whole-home units integrated into a central heating and/or cooling system. Consumer air cleaners employ a wide variety of technologies to remove particular matter and other contaminants from the air. They may include secondary functions, typically indoor air quality improvement, that supplement or enhance that primary function, such as providing air circulation, humidification, or dehumidification.

In the September 2021 NOPD, DOE proposed a definition for "air cleaner" to help inform its proposed scope of coverage and regulatory definition. 86 FR 51629, 51632. DOE consulted existing definitions and classifications of consumer air cleaners developed by AHAM—the industry trade group for consumer air cleaners—and the ENERGY STAR Program, and additional market research conducted by DOE. *Id.* at 86 FR 51631.

AHAM defined "air cleaner" in an industry standard, it published and which is certified by American National Standards Institute ("ANSI"), to measure the performance of portable household electric room air cleaners, titled ANSI/AHAM AC-1-2020 *Portable Household Electric Room Air Cleaners* ("ANSI/AHAM AC-1-2020").[7] Section 3.1 of ANSI/AHAM AC-1-2020 defines "Portable Household Electric Room Air Cleaner" as "[a]n electric appliance with the function of removing particulate matter from the air and which can be moved from room to room."

[7] ANSI/AHAM AC-1-2020 available at AHAM website at *www.aham.org/itemdetail?iproductcode=30002&category=padstd*.

The ENERGY STAR Program also establishes a definition for room air cleaners (also referred to as air purifiers), in addition to qualification criteria for an air cleaner to earn the ENERGY STAR label.[8] The current ENERGY STAR V2.0 Product Specification[9] defines "room air cleaner" as "an electric appliance with the function of removing particulate matter from the air and which can be moved from room to room," consistent with ANSI/AHAM AC-1-2020.

As discussed in the September 2021 NOPD, the definitions in ANSI/AHAM AC-1-2020 and the ENERGY STAR V2.0 Product Specification include specific air cleaning and air purifying designs and technologies, but are limited to "portable" air cleaners that "can be moved from room to room." DOE noted in the September 2021 NOPD that while ANSI/AHAM AC-1-2020 specifies that the standard is applicable only to portable air cleaners, it includes definitions and setup instructions for air cleaners that include wall mounting brackets or instructions to mount the air cleaner integrally to the wall. 86 FR 51629, 51632. To cover a more comprehensive range of the consumer market for air cleaning and purification, an expanded definition of a consumer air cleaner may be appropriate. DOE therefore considered a modified definition that would include other consumer air cleaners, such as those that are mounted on walls and ceilings, or that are designed for whole-home air cleaning in conjunction with central heating or air conditioning systems. 86 FR 51629, 51632. The proposed definition expands the range of products to include those that use technologies that clean the air by destroying or deactivating contaminants, including microbes as well as particulates, from the air (instead of only removing them). *Id.* at 86 FR 51632.

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[8] See ENERGY STAR website for air purifiers (cleaners) at *www.energystar.gov/products/air_purifiers_cleaners*.

[9] See Eligibility Criteria Version 2.0, Rev. April 2021, available at *www.energystar.gov/sites/default/files/ENERGY%20STAR%20Version%202.0%20Room%20Air%20Cleaners%20Specification_Rev%20April%202021_with%20Partner%20Commitments.pdf*

DOE proposed in the September 2021 NOPD to define a consumer air cleaner as a consumer product that:

1) Is a self-contained, mechanically encased assembly;
2) Is powered by single-phase electric current;
3) Removes, destroys, or deactivates particulates and microorganisms from the air; and
4) Excludes products that destroy or deactivate particulates and microorganisms solely by means of ultraviolet ("UV") light without a fan for air circulation; and
5) Excludes central air conditioners, room air conditioners, portable air conditioners, dehumidifiers, and furnaces as defined in 10 CFR 430.2. . 86 FR 51629, 51632.

As discussed in the September 2021 NOPD, DOE proposed to exclude from coverage those consumer products that purify air solely by means of UV light without circulating air through the product using a fan because the energy-consuming component of such products would be a fluorescent lamp or light-emitting diode designed to emit light in the UV portion of the electromagnetic spectrum. 86 FR 51629, 51632. Accordingly, DOE would classify these products under EPCA as a type of lamp (see the definition of "lamps primarily designed to produce radiation in the ultraviolet region of the spectrum" and "light-emitting diode or LED" in 10 CFR 430.2), and therefore, did not consider applying any future consumer air cleaner requirements to these products. *Id*.

DOE continues to evaluate comments received from interested parties in response to the proposed definition for consumer air cleaners in the September 2021 NOPD.

B. Test Procedure for Consumer Air Cleaners

DOE has examined existing test methods to measure key performance characteristics for determining the energy efficiency of consumer air cleaners. These performance characteristics include clean air delivery rate ("CADR"), operating (*i.e.*, active) mode power consumption, and standby mode power consumption. DOE is seeking comment on whether the test methods identified below, could be used as the basis for a DOE test procedure for consumer air cleaners. In particular, DOE is seeking comment on any modifications to these test methods that would be needed to test the full range of products under DOE's proposed definition of consumer air cleaner.

1. Current Industry Test Procedure

As discussed, AHAM published ANSI/AHAM AC-1-2020 for measuring the performance of portable household electric room air cleaners.

Section 3.14 of ANSI/AHAM AC-1-2020 defines CADR as the metric to measure an air cleaner's efficacy in removing particulate matter from the air. CADR represents the rate of particulate reduction in the test chamber when the air cleaner is turned on, minus the rate of "natural decay"[10] when the air cleaner is not running, multiplied by the volume of the test chamber (specified as 1,008 cubic feet). As such, testing an air cleaner requires conducting two separate tests: a first test with the air cleaner turned off, and a second test

[10] AHAM defines "natural decay" as the reduction of particulate matter due to natural phenomena in the test chamber: principally agglomeration [a process in which fine particles "clump" together], surface deposition [a process in which particles attach to a surface] (including sedimentation [a process in which particles settle out of suspension in the air onto a surface due to gravity]), and air exchange.

with the air cleaner turned on. The CADR value is expressed in units of cubic feet per minute ("cfm").[11]

Sections 5, 6, and 7 of ANSI/AHAM AC-1-2020 specify procedures for measuring air cleaner efficacy using three different types of particulates representing three ranges of particulate matter size: pollen (5 micrometer ("μm") to 11 μm diameter), dust (0.5 μm to 3.0 μm diameter), and cigarette smoke (0.10 μm to 1.0 μm diameter), respectively.

Section 2 of ANSI/AHAM AC-1-2020 indicates that the precision of the test method is as follows: ± 25 cfm for pollen CADR; ± 10 cfm for dust CADR; and ± 10 cfm for cigarette smoke CADR. Given these levels of precision, ANSI/AHAM AC-1-2020 is limited to measuring air cleaners within rated CADR ranges of 10 to 600 cfm for dust and cigarette smoke and 25 to 450 cfm for pollen.

Section 9 of ANSI/AHAM AC-1-2020 also includes methods to measure the air cleaner's operating power and standby power usage in Watts ("W"), as discussed further in sections II.B.1.a and II.B.1.b of this document.

All CADR and power testing are performed in a test chamber with a controlled environment. Section 4 of ANSI/AHAM AC-1-2020 specifies requirements for electrical power supply, test chamber ambient temperature, test chamber air exchange rate, test chamber particulate concentrations, and use of a recirculation fan in the test chamber.

[11] Although the unit of measurement for CADR is cfm, ANSI/AHAM AC-1-2020 explains that CADR values indicate the performance of an air cleaner as a complete system and that the metric has no linear relationship to air movement or to the characteristics of any particular particle removal methodology *per se*.

a. Operating (Active) Mode Testing

ANSI/AHAM AC-1-2020 specifies methodologies to obtain consistent levels of particulate concentration in the test chamber for each of the three particulate types. An aerosol generator disseminates the appropriate particulate for each test. The method also discusses using other devices, such as a cigarette smoke diluter and aerosol spectrometer to maintain consistent test particulate levels during the test and to measure the particle size distribution within the room air, respectively. For each particulate, two tests are performed, one with the air cleaner not operating and one with it operating. First, to measure the natural decay of the particulate under evaluation, the air cleaner is not operated and the particulates are distributed within the room at a specified concentration. Particulate concentration is measured and averaged over a period of time prescribed for each particulate type. In the second test, the air cleaner is operated at the setting that results in the maximum particulate removal rate and the particulate matter removal is measured using the same process as in the first test. Particulate concentration is again measured over a prescribed period of time, and the rate of particulate reduction is calculated. The difference of the rate of particulate reduction with the air cleaner operating minus the rate of natural decay with the air cleaner not operating, multiplied by the volume of the test chamber, provides the CADR value for that particulate type.

Section 9 of ANSI/AHAM AC-1-2020 specifies methods for measuring operating power. The section allows measuring operating power during the CADR test for either cigarette smoke or dust, the duration of each being greater than 15 minutes, which is enough time to measure operating power. After the air cleaner motor has been conditioned as specified in Section 9.2 of ANSI/AHAM AC-1-2020, the power measuring instrument is connected between the power supply and air cleaner, and all

settings/options are set at the maximum level. The air cleaner is operated for 2 minutes without any power measurements, and then power consumption is recorded at 1-minute intervals for 13 minutes (for a total test time of 15 minutes). Up to three of the 13 data points may be discarded as anomalous to account for line surges and other variables. The remaining power measurements are averaged to obtain the operating power, in W, of the air cleaner.

DOE requests comments on whether ANSI/AHAM AC-1-2020 provides an appropriate method to use as the basis for a Federal test method and for defining energy conservation standard levels for consumer air cleaners.

DOE requests comment on the use of the CADR, as opposed to another metric such as rate of decay, to characterize consumer air cleaner performance. In particular, DOE requests comment on whether consumers could find the unit of measurement of cfm for CADR confusing and misunderstand it as referring to the rate of air movement through the device.

DOE requests comment on whether the power measurement could vary based on the particulate test that is used to measure operating power. If power measurement varies based on the particulate test, DOE requests comment on which particulate test (pollen, dust, or cigarette smoke) should be used as the basis for the power measurement in any Federal test procedure that DOE may develop. Alternately, DOE requests comment on whether it should consider requiring power measurements for each particulate test and use a simple or weighted average to determine operating power.

DOE requests comment on whether it should consider testing consumer air cleaners at any other power level in addition to the maximum power level required by ANSI/AHAM AC-1-2020.

DOE requests comment on whether ANSI/AHAM AC-1-2020 could also be used to test other types of consumer air cleaners, such as ceiling- mounted products.

b. Standby Mode Testing

Section 10 of ANSI/AHAM AC-1-2020 specifies a measurement procedure for standby mode that is performed as a separate test from the CADR and operating power tests. The standby power test specifies allowable ranges for three environmental conditions: air speed in the room, ambient air temperature, and voltage supply. As specified, the standby power test method may only be used when the selected mode and measured power consumption are stable (defined as a variation of less than 5 percent in measured power consumption over 5 minutes). When stability is not achieved, power consumption can be determined by alternative methods: by averaging the power readings over a specified period of time or by recording the energy consumption over a specified period and dividing by the total time period.

To perform the standby mode test, the air cleaner is connected to the metering equipment. After the air cleaner has been allowed to stabilize for at least 5 minutes, the power consumption is monitored for not less than an additional 5 minutes. If the power consumption does not drift by more than 5 percent (from the maximum value observed) during the latter 5 minutes, the load is considered stable and the power consumption can be recorded directly from the instrument at the end of the latter 5 minute period. The resulting standby power is reported in W, rounded to the nearest hundredths.

The standby mode test method specified in ANSI/AHAM AC-1-2020 is different from that specified in the most current version of IEC Standard 62301, Edition 2.0, "Household electrical appliances – Measurement of standby power" ("IEC 62301 Ed. 2.0"), which is the standard that EPCA directs DOE to consider when including measurements of standby mode and off mode energy use in its test procedures for covered products, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)) IEC 62301 Ed. 2.0 provides three methods to measure standby power, depending on the characteristics of the power consumption in standby mode (*e.g.*, stable, unstable, cyclic, of a limited duration, *etc.*) The three methods are: the sampling method, the average reading method, and the direct meter reading method. The sampling method, which is the method incorporated by reference most frequently in DOE test procedures for other covered products, specifies that the unit under test must be operated in standby mode for at least 15 minutes and standby power is recorded at least once every second. To determine standby power, the data from the second two-thirds of the total test duration is used to determine stability. If the measured power is less than or equal to 1 W, stability is established when a linear regression through all power readings for the second two-thirds of the total period has a slope of less than 10 milliwatts per hour ("mW/h"). If the measured power is greater than 1 W, stability is established when a linear regression through all power readings for the second two-thirds of the total period has a slope that is less than 1 percent of the measured input power per hour.

DOE requests comment on the suitability of the standby power measurement procedure specified in ANSI/AHAM AC-1-2020, IEC 62301 Ed. 2.0, or any other test method for measuring standby mode and off mode energy use of consumer air cleaners, in light of EPCA's requirement in 42 U.S.C. 6295(gg)(2)(A)) for DOE to consider the most current version of IEC Standard 62301.

2. Other Test Procedures

In addition to ANSI/AHAM AC-1-2020, DOE is aware of a few other test methods for air cleaners. DOE has identified two test methods to measure how effectively a unit removes microorganisms from the air (as opposed to particles such as smoke, pollen, and dust). DOE has additionally identified two other test methods that measure the effectiveness of removing particulates from the air, similar to the ANSI/AHAM AC-1-2020 testing standard.

The first of these test methods was developed by the Center for Engineering and Environmental Technology at Research Triangle Institute ("RTI"), titled "Methodology to Perform Clean Air Delivery Rate Type Determinations with Microbiological Aerosols"[12] ("RTI Test Method"). The stated objective of the RTI Test Method is to determine a CADR-type measurement for an air cleaner using microbiological aerosols. The method is described as a modification of the ANSI/AHAM AC-1 test method that can be used for evaluating a wide range of air cleaning devices. Similar to the ANSI/AHAM AC-1-2020 test method, the RTI Test Method requires measuring the natural decay rate without the air cleaner operating and the particulate removal rate while the air cleaner is operating in a test chamber. The RTI Test Method has been conducted using mold, bacteria, and viruses, representing the primary groups of microorganisms that a household air cleaner would be expected to remove in a home.

The second of these test methods was developed by researchers at Korea Testing Laboratory ("KTL"), Dongguk University, and Biot Korea Inc., titled "Assessment of air purifier on efficient removal of airborne bacteria, Staphylococcus epidermidis, using single-chamber method"[13] ("KTL Test Method"). The objective of the KTL Test Method

[12] RTI Test Method available at: *doi.org/10.1080/713834074*.
[13] KTL Test Method available at: *link.springer.com/article/10.1007/s10661-019-7876-3*.

is to measure an air cleaner's efficacy of removing airborne bacteria from indoor air. Similar to ANSI/AHAM AC-1-2020 and the RTI Test Method, the KTL Test Method involves measuring both a natural decay rate (*i.e.*, without the air cleaner operating) and a particulate decay rate while the air cleaner is operating in a test chamber. The output of the KTL Test Method, unlike ANSI/AHAM AC-1-2020 and the RTI Test Method, which output a CADR value (with units of cfm), is a unitless value representing the ratio of the natural decay rate to the particulate decay rate.

The third of these test methods is the ANSI/American Society of Heating, Refrigerating and Air-Conditioning Engineers ("ASHRAE") standard 52.2-2017, titled "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size"[14] ("ASHRAE 52.2-2017"). ASHRAE 52.2-2017 specifies a test method to evaluate air cleaner performance as a function of particle size using an aerosol generator to introduce standardized amounts of dust at periodic intervals to simulate accumulation of particles over the lifetime of the air cleaner. The standard measures air cleaner performance based on the removal efficiency of particles with 12 defined particle size ranges between 0.3 and 10 μm in diameter. Efficiency measurements for each of the 12 particle size ranges are taken at various dust loads by challenging the filter with potassium chloride particles. This test aerosol provides particles over the entire range of 0.3 to 10 μm required by the test procedure. The output metric is the minimum efficiency reporting value ("MERV"), that quantifies the effectiveness of the air cleaner's filtration on a 16-point scale.

The fourth testing method is from the National Research Council Canada ("NRCC"). The NRCC's publication is titled, "Method for Testing Portable Air

[14] ASHRAE 52.2-2017 available at: *ashrae.org/File%20Library/Technical%20Resources/COVID-19/52_2_2017_COVID-19_20200401.pdf*

Cleaner's"[15] ("NRCC Test Method"). The NRCC Test Method determines the air cleaner's performance by measuring particle, volatile organic compounds ("VOCs") (including formaldehyde, toluene, and d-limonene), and ozone removal. Known quantities of particles of different sizes, ozone, and the selected VOCs are introduced in different tests until a certain established target concentration is achieved. The NRCC Test Method provides multiple suggested procedures for injecting particles and VOCs into the test chamber. Once target contaminant levels in the test chamber have been achieved, the injection of particles or VOCs is stopped, and the concentration decay rate is measured while the air cleaner is operating. Particle concentration is recommended to be measured using either a condensation particle counter, optical particle counter, or an aerodynamic particle sizer. Formaldehyde concentration is determined using a high-performance liquid chromatograph technique and toluene and d-limonene concentrations are measured using a gas chromatograph – mass spectrometer technique. Ozone levels in the chamber air are determined using an analyzer based on either chemiluminescence or UV absorption. These results are then compared to test results without the air cleaner operating to assess the removal effectiveness of the unit.

Additionally, in response to the September 2021 NOPD, AHAM commented that it was working on an updated standard to measure the energy efficiency for room air cleaners, AHAM AC-7-2021, "Energy Test Method for Portable Air Cleaners". (Docket No. EERE-2021-BT-DET-0022, AHAM, No. 13 at p. 1) AHAM has not yet issued this test method.

[15] NRCC Test Method available at: *nrc-publications.canada.ca/eng/view/ft/?id=cc1570e0-53cc-476d-b2ee-3e252d8bd739*

DOE requests comment on whether it should consider any methodology for measuring the removal efficacy of microorganisms (*i.e.,* viruses, bacteria, mold, *etc.*) from indoor air as part of a Federal test procedure for consumer air cleaners.

DOE requests comment on the suitability of each of the RTI Test Method and the KTL Test Method for measuring a consumer air cleaner's removal efficacy of microorganisms from indoor air.

DOE requests comment on the additional test methods identified in this section that measure the performance of consumer air cleaners using various particulates. In particular, DOE requests comment on the scope, methodology, and types of particulates, pollutants, and/or microorganisms that are included in each test method.

DOE requests comments on whether any other test methods have been developed for consumer air cleaners that would be relevant to DOE's consideration of a Federal test procedure to measure the energy efficiency of consumer air cleaners. In particular, DOE seeks comment on test methods that could be used to test "non-portable" consumer air cleaners, such as those that are permanently mounted (*e.g.,* ceiling-mounted air cleaners) or that provide whole-home air cleaning in conjunction with central heating or air conditioning systems; and test methods that could be used to measure the performance of consumer air cleaners that destroy or deactivate contaminants from the air instead of removing them.

C. Metric for Consumer Air Cleaners

As discussed, EPCA requires that any test procedure prescribed or amended must be reasonably designed to produce test results which reflect energy efficiency, energy use

or estimated annual operating cost of a given type of covered product during a representative average use cycle and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, EPCA requires DOE to amend its test procedure for all covered products to integrate measures of standby mode and off mode energy consumption into the overall energy efficiency, energy consumption, or other energy descriptor, taking into consideration the most current versions of IEC Standards 62301 and 62087. There are only two exceptions: if the current test procedure already incorporates the standby mode and off mode energy consumption, or if such integration is technically infeasible. (42 U.S.C. 6295(gg)(2)(A)) If an integrated test procedure is technically infeasible, DOE must prescribe separate standby mode and off mode energy use test procedures for the covered product, if a separate test is technically feasible. (*Id*.)

The ENERGY STAR V2.0 Product Specification[16] for Room Air Cleaners defines separate "on mode" (*i.e*., active mode) and "partial on mode" (*i.e.*, standby/off mode) metrics to certify air cleaners under the ENERGY STAR label. The on mode criterion is defined in terms of a minimum "CADR/W" metric. That metric, in turn, is defined as the rated smoke CADR measurement divided by the operating power consumption measured during the smoke particle removal test, each of which is determined in accordance with ANSI/AHAM AC-1-2020. The partial on mode criterion is defined in terms of a maximum wattage level, as determined in accordance with IEC Standard 62301.

[16] See Eligibility Criteria Version 2.0, Rev. April 2021, available at *www.energystar.gov/sites/default/files/ENERGY%20STAR%20Version%202.0%20Room%20Air%20Cleaners%20Specification_Rev%20April%202021_with%20Partner%20Commitments.pdf*

In accordance with the requirements of EPCA, DOE would evaluate whether an integrated test procedure (*i.e.*, a test procedure that integrates measures of standby mode and off mode energy consumption into the overall energy efficiency descriptor) is technically feasible. For example, DOE could define an integrated CADR/W metric in which the denominator represents a weighted average of the power consumption associated with active mode, standby mode, and off mode, weighted by the amount of time spent in each mode. DOE notes that the ENERGY STAR program assumes 16 active mode hours per day and 8 inactive mode (*i.e.*, standby or off mode) hours per day to calculate annual energy consumption of qualifying consumer air cleaners.[17]

DOE requests comment on the technical feasibility of integrating measures of standby mode and off mode energy consumption into the overall energy efficiency descriptor (*i.e.*, creating an integrated metric) for consumer air cleaners. In particular, DOE requests comment on its example approach of defining an integrated CADR/W metric, in which the denominator would represent a weighted average of the power consumption associated with active mode, standby mode, and off mode, weighted by the amount of time spent in each mode.

DOE requests comment on consumer usage of consumer air cleaners, in particular, the amount of time spent in active mode, standby mode, and off mode.

As discussed previously, ANSI/AHAM AC-1-2020 specifies procedures for measuring CADR ratings for three types of particulate matter: pollen, dust, and cigarette smoke. Prior to Version 2.0 of the Product Specification for Room Air Cleaners, the ENERGY STAR eligibility criteria were based on the CADR/W metric using the dust

[17] The ENERGY STAR online product database provides a description of the Annual Energy Use calculation at *data.energystar.gov/dataset/ENERGY-STAR-Certified-Room-Air-Cleaners/jmck-i55n/data*.

particle removal test. That changed in a draft version of the V2.0 Product Specification,[18] where EPA described its understanding that smoke pollutants can have the greatest health risk for the general population and that the AHAM Verification Program for room air cleaners calculates the appropriate room size for a given room air cleaner based on the cigarette smoke CADR measurement. (See Note box in Section 3.3.1 of the draft.) EPA also stated that retailers appear to use this calculation to direct consumers to a specific room air cleaner. *Id.* EPA noted that cigarette smoke has the smallest particle size of the three pollutants tested to the ANSI/AHAM AC-1-2015 standard and is typically the most energy intensive to remove. *Id.* For these reasons, and in consideration of stakeholder feedback, EPA asserted that cigarette smoke is the appropriate pollutant to use as the basis for evaluating the energy efficiency of room air cleaners. *Id.*

DOE requests comment on whether cigarette smoke would be the appropriate particulate for determining a CADR rating of air cleaners under a DOE test procedure, should DOE adopt a measurement of CADR in a test procedure for consumer air cleaners. If cigarette smoke is not the most appropriate particulate, DOE requests comment on other particulate(s) that would be more appropriate as the basis for measurement, including data and information to support such a recommendation.

As discussed previously, ANSI/AHAM AC-1-2020 specifies that it can be used to test "portable" air cleaners that "can be moved from room to room."[19] These include floor type, table type, and wall type units. Ceiling type units are explicitly outside the scope of that test method. ANSI/AHAM AC-1-2020 also does not apply to "non-portable" consumer air cleaners, such as those that are designed for whole-home air cleaning in

[18] See Draft 1 Version 2.0 specification at *www.energystar.gov/products/spec/room_air_cleaners_version_2_0_pd*.
[19] DOE notes the vague nature of "can be," which depends greatly on the abilities of the person or people involved in attempting to move the item.

conjunction with central heating or air conditioning systems. DOE is not aware of test procedures for these types of units and seeks guidance on whether the CADR/W efficiency metric would be appropriate for characterizing the energy efficiency of these types of units. DOE also seeks guidance about consumer air cleaners that clean the air by destroying or deactivating particulates and microorganisms from the air instead of removing them (for example, a consumer air cleaner designed to purify air using UV light or other heat in combination with a fan to circulate air through the product). In particular, DOE seeks input on whether the CADR/W metric would be appropriate for such products.

DOE requests comment on whether the CADR/W efficiency metric would be appropriate for characterizing the energy efficiency of consumer air cleaner units permanently mounted to a structure.

DOE requests comment on whether the CADR/W metric would be appropriate for consumer air cleaners that clean the air by destroying or deactivating particulates and microorganisms from the air instead of removing them.

DOE requests comment on whether any other metrics not already discussed in this RFI would provide a better measure of energy efficiency or energy use of consumer air cleaners during a representative average use cycle or period of use.

III. Request for Information and Comments Pertaining to Potential Energy Conservation Standards

DOE is also publishing this RFI to collect data and information to inform its decision, consistent with its obligations under EPCA, as to whether the Department

should proceed with an energy conservation standards rulemaking. In the following sections, DOE has identified a variety of issues on which it seeks input to aid in the development of the technical and economic analyses regarding whether standards for consumer air cleaners may be warranted.

As stated previously, following a coverage determination, EPCA outlines four criteria for prescribing an energy conservation standard for a newly covered product. The four criteria are that: (1) the average per household domestic energy use by such products exceeded 150 kWh (or its Btu equivalent) for any 12-month period ending before such determination; (2) the aggregate domestic household energy use by such product exceeded 4.2 million kWh (or its Btu equivalent) for any such 12-month period; (3) substantial improvement in the energy efficiency of the products is technologically feasible; and (4) applying a labeling rule is not likely to be sufficient to induce manufacturers to produce, and consumers and other persons to purchase, products of such type which achieve the maximum energy efficiency which is technologically feasible and economically justified. (42 U.S.C. 6295(l)(1))

DOE seeks data and information on whether the four criteria for prescribing an energy conservation standard for air cleaners are met.

DOE seeks comment on whether energy conservation standards for consumer air cleaners would be economically justified, technologically feasible, and would result in a significant savings of energy.

A. Market and Technology Assessment

The market and technology assessment that DOE routinely conducts when analyzing the impacts of a potential new or amended energy conservation standard provides information about the consumer air cleaner industry that will be used in DOE's analysis throughout the rulemaking process. DOE uses qualitative and quantitative information to characterize the structure of the industry and market. DOE identifies manufacturers, estimates market shares and trends, addresses regulatory and non-regulatory initiatives intended to improve energy efficiency or reduce energy consumption, and explores the potential for efficiency improvements in the design and manufacturing of consumer air cleaners. DOE also reviews product literature, industry publications, and company websites. Additionally, DOE considers conducting interviews with manufacturers to improve its assessment of the market and available technologies.

For consumer air cleaners, DOE is interested in understanding the consumer air cleaner market, the impact of the current COVID-19 pandemic on this market, and whether the current industry trends are a result of the pandemic or expected to stay long-term.

DOE seeks feedback on how the COVID-19 pandemic has impacted the consumer air cleaner market. DOE requests any available market data or information on recent consumer behavior trends for consumer air cleaners in response to the pandemic.

1. Product Classes

When evaluating and establishing energy conservation standards, DOE may divide covered products into product classes by the type of energy used, or by capacity or

other performance-related features that justify a different standard. (42 U.S.C. 6295(q)) In making a determination whether capacity or another performance-related feature justifies a different standard, DOE must consider such factors as the utility of the feature to the consumer and other factors DOE deems appropriate. (*Id*.) For consumer air cleaners, DOE may use CADR as a measurement of capacity.

DOE requests comment on whether capacity or any other performance-related features, such as air cleaning technology (*i.e.*, whether the product destroys or deactivates contaminants from the air or removes them), of consumer air cleaners would justify the establishment of different product classes (*i.e.,* would justify different standards for such classes).

2. Technology Assessment

In analyzing the feasibility of potential new energy conservation standards, DOE uses information about technology options and prototype designs to help identify technologies that manufacturers could use to meet and/or exceed a given energy conservation standard level under consideration. In consultation with interested parties, DOE intends to develop a list of technologies to consider in its analysis.

DOE seeks information on technologies that are used to improve the energy efficiency of consumer air cleaners. Specifically, DOE seeks information on the range of efficiencies or performance characteristics that are currently available for each technology option.

For each technology option suggested by stakeholders, DOE seeks information regarding its market adoption, costs, and any concerns with incorporating the technology

into products (*e.g.*, impacts on consumer utility, potential safety concerns, manufacturing or production challenges, *etc.*).

B. Screening Analysis

The purpose of the screening analysis is to evaluate the technologies that improve energy efficiency to determine which technologies will be eliminated from further consideration and which will be passed to the engineering analysis for further consideration.

DOE determines whether to eliminate certain technology options from further consideration based on the following criteria:

(1) *Technological feasibility*. Technologies that are not incorporated in commercial products or in working prototypes will not be considered further.

(2) *Practicability to manufacture, install, and service.* If it is determined that mass production of a technology in commercial products and reliable installation and servicing of the technology could not be achieved on the scale necessary to serve the relevant market at the time of the compliance date of the standard, then that technology will not be considered further.

(3) *Impacts on product utility or product availability.* If a technology is determined to have significant adverse impact on the utility of the product to significant subgroups of consumers, or result in the unavailability of any covered product type with performance characteristics (including reliability),

features, sizes, capacities, and volumes that are substantially the same as products generally available in the United States at the time, it will not be considered further.

(4) *Adverse impacts on health or safety.* If it is determined that a technology will have significant adverse impacts on health or safety, it will not be considered further.

(5) *Unique-Pathway Proprietary Technologies.* If a design option utilizes proprietary technology that represents a unique pathway to achieving a given efficiency level, that technology will not be considered further due to the potential for monopolistic concerns.

Sections 6(b)(3) and 7(b) of the Process Rule.

Technology options identified in the technology assessment are evaluated against these criteria using DOE analyses and inputs from interested parties (*e.g.*, manufacturers, trade organizations, and energy efficiency advocates). Technologies that pass through the screening analysis are referred to as "design options" in the engineering analysis. Technology options that fail to meet one or more of the five criteria are eliminated from consideration.

DOE requests feedback on whether any air cleaner technology options would be screened out based on the five screening criteria described in this section. DOE also requests information on the technologies that would be screened out and the screening criteria that would be applicable to each screened out technology option.

C. Engineering Analysis

The purpose of the engineering analysis is to establish the relationship between the efficiency and cost of consumer air cleaners. There are two elements to consider in the engineering analysis: the selection of efficiency levels to analyze (*i.e.*, the "efficiency analysis") and the determination of product cost at each efficiency level (*i.e.*, the "cost analysis"). In determining the performance of higher-efficiency products, DOE considers technologies and design option combinations not eliminated by the screening analysis. For each product class, DOE estimates the baseline cost, as well as the incremental cost for the product at efficiency levels above the baseline. The output of the engineering analysis is a set of cost-efficiency "curves" that are used in downstream analyses (*i.e.*, the life-cycle cost ("LCC") analysis, payback period ("PBP") analysis, and the national impacts analysis ("NIA")).

1. Efficiency analysis

DOE typically uses one of two approaches to develop energy efficiency levels for the engineering analysis: (1) relying on observed efficiency levels in the market (*i.e.*, the efficiency-level approach), or (2) determining the incremental efficiency improvements associated with incorporating specific design options to a baseline model (*i.e.*, the design-option approach). Using the efficiency-level approach, the efficiency levels established for the analysis are determined based on the market distribution of existing products (in other words, based on the range of efficiencies and efficiency level "clusters" that already exist on the market). Using the design option approach, the efficiency levels established for the analysis are determined through detailed engineering calculations and/or computer simulations of the efficiency improvements from implementing specific design options

that have been identified in the technology assessment. DOE may also rely on a combination of these two approaches. For example, the efficiency-level approach (based on actual products on the market) may be extended using the design option approach to interpolate to define "gap fill" levels (to bridge large gaps between other identified efficiency levels) and/or to extrapolate to the max-tech level (particularly in cases where the max-tech level exceeds the maximum efficiency level currently available on the market).

For each product class DOE analyzes, DOE selects a baseline model as a reference point against which any changes resulting from new or amended energy conservation standards can be measured. The baseline model in each product class represents the characteristics of common or typical products in that class.

DOE requests feedback on appropriate baseline efficiency levels for DOE to apply, and the product classes to which these baseline efficiency levels would be applicable, in evaluating whether to establish energy conservation standards for consumer air cleaners.

As part of DOE's analysis, the maximum available efficiency level is the highest efficiency unit currently available on the market. DOE defines a "max-tech" efficiency level to represent the theoretical maximum possible efficiency if all available design options are incorporated in a model. In applying these design options, DOE would only include those options that are compatible with each other and that when combined would represent the theoretical maximum possible efficiency. Often, the max-tech efficiency level is not commercially available because it is not economically feasible.

DOE seeks input on identifying the max-tech efficiency level for consumer air cleaners. Additionally, for any max-tech efficiency level identified by stakeholders, DOE also seeks input on whether such a max-tech efficiency level would be appropriate and technologically feasible for potential consideration as possible energy conservation standards for consumer air cleaners, and if not, why not.

DOE seeks feedback on what design options would be incorporated at a max-tech efficiency level, and the efficiencies associated with those levels. As part of this request, DOE also seeks information as to whether there are limitations on the use of certain combinations of design options.

2. Cost analysis

The cost analysis portion of the engineering analysis is conducted using one or a combination of cost approaches. The selection of cost approach depends on a suite of factors, including availability and reliability of public information, characteristics of the regulated product, and the availability and timeliness of purchasing the product on the market. The cost approaches are summarized as follows:

- Physical teardowns: Under this approach, DOE physically dismantles a commercially available product, component-by-component, to develop a detailed bill of materials for the product.

- Catalog teardowns: In lieu of physically deconstructing a product, DOE identifies each component using parts diagrams (available from manufacturer websites or appliance repair websites, for example) to develop the bill of materials for the product.

- Price surveys: If neither a physical nor catalog teardown is feasible (for example, for tightly integrated products such as fluorescent lamps, which are infeasible to disassemble and for which parts diagrams are unavailable) or cost-prohibitive and otherwise impractical (*e.g.* large commercial boilers), DOE conducts price surveys using publicly available pricing data published on major online retailer websites and/or by soliciting prices from distributors and other commercial channels.

The resulting bill of materials provides the basis for the manufacturer production cost ("MPC") estimates. DOE then applies a manufacturer markup to convert the MPC to manufacturer selling price ("MSP"). The manufacturer markup accounts for costs such as overhead and profit.

As described at the beginning of this section, the main outputs of the engineering analysis are cost-efficiency relationships that describe the estimated increases in manufacturer production cost associated with higher-efficiency products for the analyzed product classes.

DOE requests feedback on design options that manufacturers would use to increase energy efficiency in consumer air cleaners above the baseline. This includes information on the order in which manufacturers would incorporate the different technologies to incrementally improve efficiency of products. DOE also requests feedback on whether the increased energy efficiency would lead to other design changes that would not occur otherwise. DOE is also interested in information regarding any potential impact of design options on a manufacturer's ability to incorporate additional functions or attributes in response to consumer demand.

DOE also seeks input on the increase in MPC associated with incorporating each particular design option. DOE also requests information on the investments necessary to incorporate specific design options, including, but not limited to, costs related to new or modified tooling (if any), materials, engineering and development efforts to implement each design option, and manufacturing/production impacts.

DOE requests comment on whether certain design options may not be applicable to (or incompatible with) certain types of air cleaners.

D. Distribution Channels and Markups Analysis

DOE derives customer prices based on manufacturer markups as discussed, as well as retailer markups, distributor markups, contractor markups (where appropriate), and sales taxes. In deriving the retailer and distributor markups, DOE determines the major distribution channels for product sales, the markup associated with each party in each distribution channel, and the existence and magnitude of differences between markups for baseline products ("baseline markups") and higher-efficiency products ("incremental markups"). The identified distribution channels (*i.e.*, how the products are distributed from the manufacturer to the consumer), and estimated relative sales volumes through each channel are used in generating end-user price inputs for the LCC analysis and NIA.

DOE requests data and information on typical manufacturer markups for consumer air cleaners (*i.e.*, the markup applied to the MPC to determine MSP).

DOE requests information on the existence of any distribution channels other than the retail outlet distribution channel that are used to distribute consumer air cleaners into the market.

E. Energy Use Analysis

As part of the rulemaking process, DOE conducts an energy use analysis to identify how consumers use products, and thereby determine the energy savings potential of energy efficiency improvements. The energy use analysis is meant to represent typical energy consumption in the field. DOE will base the energy consumption of consumer air cleaners on the annual energy consumption as determined by the DOE test procedure.

1. Consumer Samples and Market Breakdowns

To estimate the energy use of products in field operating conditions, DOE typically develops consumer samples that are representative of installation and operating characteristics of how such products are used in the field, as well as distributions of annual energy use by application and market segment. In a potential energy conservation standards rulemaking for consumer air cleaners, DOE may utilize the most current version of the Residential Energy Consumption Survey ("RECS") published by the U.S. Energy Information Administration ("EIA") (currently the 2015 RECS) and the most current version of the Commercial Building Energy Consumption Survey ("CBECS) also published by EIA (currently the 2012 CBECS).

DOE requests data and information regarding market applications of consumer air cleaners and how those are broken down by economic sector (*e.g.*, residential versus commercial).

2. Operating Hours

One of the key inputs to the energy use analysis is the number of annual operating hours of the product.

As discussed, the ENERGY STAR database[20] assumes that a consumer air cleaner operates for 16 hours per day and is inactive for 8 hours per day, corresponding to 5,840 active mode hours per year and 2,920 inactive mode hours annually.

DOE requests data or published reports on the number of annual operating hours of consumer air cleaners. In particular, DOE requests data or published reports on whether the annual operating hours may differ for any of the types of consumer air cleaners that would be within the scope of DOE's proposed definition of consumer air cleaner.

F. Life-Cycle Cost and Payback Period Analyses

DOE conducts the LCC and the payback period ("PBP") analyses to evaluate the economic effects of potential energy conservation standards for consumer air cleaners on individual customers. The effects of more stringent energy conservation standards on a consumer of consumer air cleaners include changes in operating expenses (usually decreased) and changes in purchase prices (usually increased). For any given efficiency level, DOE measures the PBP and the change in LCC relative to an estimated baseline level. The LCC is the total customer expense over the life of the product, consisting of purchase, installation, and operating costs (expenses for energy use, maintenance, and repair). Inputs to the calculation of total installed cost include the cost of the product—

[20] See ENERGY STAR database for air cleaners at *https://data.energystar.gov/dataset/ENERGY-STAR-Certified-Room-Air-Cleaners/jmck-i55n.*

which includes the MSP, distribution channel markups, and sales taxes—and installation costs. Inputs to the calculation of operating expenses include annual energy consumption, energy prices and price projections, repair and maintenance costs, product lifetimes, discount rates, and the year that compliance with new and amended standards is required.

DOE measures savings of potential standards relative to a "no-new-standards" case that reflects conditions without new and/or amended standards, and uses efficiency market shares to characterize the "no-new-standards" case product mix. By accounting for consumers who already purchase more efficient products, DOE avoids overstating the potential benefits from potential standards.

DOE requests information on the current energy efficiency distribution of consumer air cleaners.

DOE requests data and information on the installation costs of consumer air cleaners, and whether those vary by product class or any other factor affecting their efficiency.

G. Repair and Maintenance Costs

As noted, inputs to the calculation of operating expenses include repair and maintenance costs, among other factors.

DOE requests feedback and data on whether maintenance costs differ in comparison to the baseline maintenance costs for any air cleaner technology options.

DOE requests information and data on the frequency of repair, and repair and maintenance costs of consumer air cleaners. DOE is also interested in the market share of

consumers who simply replace the products when they fail as opposed to repairing them, and factors that affect whether consumers decide to repair or replace, such as income, geographical location, or product replacement cost and repair costs.

H. Shipments

DOE develops shipments forecasts of products to calculate the national impacts of potential new or amended energy conservation standards on energy consumption, net present value ("NPV"), and future manufacturer cash flows. DOE shipments projections are typically based on available historical data categorized by product class, capacity, and energy efficiency. Current sales estimates allow for a more accurate model that captures recent trends in the market.

DOE requests annual sales data (*i.e.*, number of shipments) of consumer air cleaners from 2016 to 2020 disaggregated to the extent possible by product class, capacity, energy efficiency level, or any other differentiating factor used in the industry. For each class/category, DOE also requests the fraction of sales that are ENERGY STAR-qualified.

To project future shipments for the residential and commercial sectors, DOE typically uses, respectively, new housing starts projections and floorspace projections from the Annual Energy Outlook (AEO) as market drivers.

DOE requests on the market drivers and saturation trends that would help project shipments for consumer air cleaners.

I. National Impact Analysis

The purpose of the NIA is to estimate the aggregate economic impacts of potential efficiency standards at the national level. The NIA assesses the national energy savings ("NES") and the national NPV of total customer costs and savings that would be expected to result from new or amended standards at specific efficiency levels.

A key component of DOE's estimates of NES and NPV is the equipment energy efficiencies forecasted over time for the no-new-standards case and for standards cases. DOE generally analyzes trends in market efficiency to project the no-new standards case efficiency over the NIA analysis period.

DOE seeks information on the expected efficiency trends in the consumer air cleaner market.

J. Manufacturer Impact Analysis

The purpose of the manufacturer impact analysis ("MIA") is to estimate the financial impact of any new energy conservation standards on manufacturers of consumer air cleaners, and to evaluate the potential impact of such standards on direct employment and manufacturing capacity. The MIA includes both quantitative and qualitative aspects. The quantitative part of the MIA primarily relies on the Government Regulatory Impact Model ("GRIM"), an industry cash-flow model adapted for each product in this analysis, with the key output of industry net present value ("INPV"). The qualitative part of the MIA addresses the potential impacts of energy conservation standards on manufacturing capacity and industry competition, as well as factors such as product characteristics, impacts on particular subgroups of firms, and important market and product trends.

As part of the MIA, DOE intends to analyze impacts of energy conservation standards on subgroups of manufacturers of covered products, including small business manufacturers. DOE uses the Small Business Administration's ("SBA") small business size standards to determine whether manufacturers qualify as small businesses, which are listed by the applicable North American Industry Classification System ("NAICS") code.[21] Manufacturing of portable consumer air cleaners is classified under NAICS 335210, "Small Electrical Appliance Manufacturing, whereas manufacturing of non-portable consumer air cleaners is classified under NAICS 333413, "Industrial and Commercial Fan and Blower and Air Purification Equipment Manufacturing." The SBA sets a threshold of 1,500 employees or less and 500 or less, respectively, for a domestic entity to be considered as a small business in these industry categories. These employee thresholds include all employees in a business' parent company and any other subsidiaries.

One aspect of assessing manufacturer burden involves examining the cumulative impact of multiple DOE standards and the product-specific regulatory actions of other federal agencies that affect the manufacturers of a covered product. While any one regulation may not impose a significant burden on manufacturers, the combined effects of several existing or impending regulations may have serious consequences for some manufacturers, groups of manufacturers, or an entire industry. Assessing the impact of a single regulation may overlook this cumulative regulatory burden. In addition to energy conservation standards, other regulations can significantly affect manufacturers' financial operations. Multiple regulations affecting the same manufacturer can strain profits and lead companies to abandon product lines or markets with lower expected future returns

[21] Available online at *www.sba.gov/document/support--table-size-standards*.

than competing products. For these reasons, DOE conducts an analysis of cumulative regulatory burden as part of its rulemakings pertaining to appliance efficiency.

To the extent feasible, DOE seeks the names and contact information of any domestic or foreign-based manufacturers that distribute consumer air cleaners in the United States.

In particular, DOE requests the names and contact information of small businesses, as defined by the SBA's size threshold, that manufacture consumer air cleaners in the United States. In addition, DOE requests comment on any other manufacturer subgroups that could be disproportionally impacted by any new energy conservation standards. DOE requests feedback on any potential approaches that it could consider to address impacts on manufacturers, including small businesses.

DOE requests information regarding the cumulative regulatory burden impacts on manufacturers of consumer air cleaners associated with (1) other DOE standards applying to different products that these manufacturers may also make and (2) product-specific regulatory actions of other federal agencies. DOE also requests comment on its methodology for computing cumulative regulatory burden and whether there are any flexibilities it can consider that would reduce this burden while remaining consistent with the requirements of EPCA.

IV. Submission of Comments

DOE invites all interested parties to submit in writing by the date specified under the **DATES** heading, comments and information on matters addressed in this RFI and on other matters relevant to DOE's consideration of establishing test procedure and energy

conservation standards for consumer air cleaners. These comments and information will aid in the development of a test procedure NOPR and energy conservation standard NOPR for consumer air cleaners in which DOE determines that establishing test procedure and energy conservation standards may be appropriate for these products.

Submitting comments via www.regulations.gov. The *www.regulations.gov* web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Following this instruction, persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit information to *www.regulations.gov* for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information ("CBI")). Comments submitted through *www.regulations.gov* cannot be claimed as CBI. Anyone submitting

comments through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through *www.regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that *www.regulations.gov* provides after you have successfully uploaded your comment.

Submitting comments via email. Comments and documents submitted via email also will be posted to *www.regulations.gov*. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. Faxes will not be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide only documents that are: not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

DOE considers public participation to be a very important part of the process for developing test procedures and energy conservation standards. DOE actively encourages the participation and interaction of the public during the comment period in each stage of this process. Interactions with and between members of the public provide a balanced discussion of the issues and assist DOE in the process. Anyone who wishes to be added to the DOE mailing list to receive future notices and information about this process should contact Appliance and Equipment Standards Program staff at (202) 287-1445 or via e-mail at *ApplianceStandardsQuestions@ee.doe.gov*.

Signing Authority

This document of the Department of Energy was signed on January 13, 2022, by Kelly J. Speakes-Backman, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, D.C., on January 14, 2022.

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Treena V. Garrett
Federal Register Liaison Officer,
U.S. Department of Energy

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